Prevalence of Children with Chronic Asthma and their Use of Health Care Services: A Comparison of Carolina ACCESS I Provider Practices within and outside of the NC DMA Asthma Collaborative

EXECUTIVE SUMMARY

OBJECTIVES

Asthma affects many people across the United States and consumes millions of dollars in healthcare expenditures each year. The Division of Medical Assistance (DMA) has noted a steady increase in asthma prevalence in the North Carolina Medicaid population and has taken steps to improve care for persons with asthma. This study is an evaluation of a primary care provider-based intervention supported by the Division, which included the *NC DMA Asthma Collaborative for ACCESS 1 Practice* and other pediatric and family practices in the Carolina ACCESS system of care.

METHODS

Twenty Carolina ACCESS providers participated in the *NC DMA Asthma Collaborative for ACCESS 1 Practice;* four of them switched to ACCESS 2 during the study period and were excluded from the study at that time. The comparison group consisted of all other Carolina ACCESS general practitioners and pediatric providers. Medicaid Claims and Claims Detail data were used to identify five to seventeen year old children with chronic asthma according to the HEDIS specifications, and their use of services such as inpatient stays, outpatient and ER visits, and prescription drugs. Children with chronic asthma were included in the study if they were enrolled for 11 or 12 months of the fiscal year with Carolina ACCESS as their system of care.

RESULTS

The results of this study show that between 5% and 6% of children ages 5 - 17, who were continuously enrolled with their system of care, had chronic asthma as defined by HEDIS. The percentage of children with chronic asthma receiving appropriate medications increased over the three fiscal years: for children linked to Carolina ACCESS providers in the collaborative, it increased from 74.6% to 86.1% in the three years studied, and for children linked to Carolina ACCESS providers in the comparison group, it increased from 69.7% to 79.7%. The average amount paid for asthma control medications per child with chronic asthma increased from $435 in FY 2000-2001 to $625 in FY 2002-2003 for the collaborative, and from $419 in FY 2000-2001 to $536 in FY 2002-2003 for the comparison group. The percentage of children with chronic asthma having ER visits decreased in the three fiscal years studied. For children linked to Carolina ACCESS providers in the collaborative, the percentage of children with ER visits decreased from 27.9% to 17.5%, and for children linked to Carolina ACCESS providers in the comparison group, it decreased from 27.2% to 20.8%. The average amount paid for ER visits per child with chronic asthma in the collaborative decreased markedly from $50 in FY 2000-2001 to $28 in FY 2002-2003; in contrast, there was a change from $43 in FY 2000-2001 to $36 in FY 2002-2003 for the comparison group. The percentage of children with chronic asthma with inpatient hospitalizations declined as well in the time period between FY 2000-2001 to FY 2002-2003: for children linked to Carolina ACCESS providers in the collaborative, the percentages of children with chronic asthma who were hospitalized declined from 5.9% to 3.7%, and for children

linked to Carolina ACCESS providers in the comparison group, the percentage declined from 6.0% to 5.1%. The average amount paid for inpatient hospitalizations in the collaborative declined markedly from $104 in FY 2000-2001 to $58 in FY 2002-2003. For the comparison group, the average amount paid for inpatient hospitalizations per child with chronic asthma decreased from $114 in FY 2000-2001 to $95 in FY 2002-2003. For the collaborative, the percentage of children with chronic asthma having four or more outpatient visits increased from 14.6% in FY 2000-2001 to 21.9% in FY 2002-2003. For children linked to Carolina ACCESS providers in the comparison group, the percentage decreased slightly from 17.3% in FY 2000-2001 to 16.9% in FY 2002-2003. The average amount paid for outpatient visits in the collaborative increased from $43 in FY 2000-2001 to $62 in FY 2002-2003 compared to a slight increase for the comparison group from $52 in FY 2000-2001 to $54 in FY 2002-2003. For Carolina ACCESS collaborative providers, the average total amount paid per child with chronic asthma increased from $632 in FY 2000-2001 to $773 in FY 2002-2003. For the comparison group, the average total amount paid per child with chronic asthma increased from $628 in FY 2000-2001 to $723 in FY 2002-2003. Over all three fiscal years, the average total amount paid per child with chronic asthma per year was $652 for the collaborative, and, slightly higher, $663 for the comparison group.

CONCLUSIONS

Children with chronic asthma enrolled with Carolina ACCESS providers participating in the *NC DMA Asthma Collaborative for ACCESS 1 Practice* showed more positive health outcomes than children enrolled with Carolina ACCESS pediatric and family practice providers in the comparison group. The percentage receiving appropriate medications and having outpatient visits increased for children with chronic asthma managed by collaborative providers, and the number of ER visits and hospitalizations decreased, as postulated in the collaborative project objectives (although the targeted outcomes have not yet been reached). Though the average amount spent per child with chronic asthma is very similar for the collaborative and the comparison group Carolina ACCESS providers, the services the children utilized differed substantially. The number of inpatient and ER services utilized by children with chronic asthma in the collaborative decreased over time as did the average amount paid for these services per child with chronic asthma. The number of outpatient services and asthma long-term control medications and also the average amount paid for these services per child with chronic asthma increased over the time period for the collaborative. For the comparison group, the results show trends in the same direction, but are not as pronounced as for the collaborative. The result is that in FY 2002-2003, the Carolina ACCESS collaborative providers had substantially higher levels of outpatient and long-term asthma control medicine use than the comparison group, and lower levels of hospital and emergency room use. Regular and frequent outpatient visits provide the opportunity for providers and their patients with chronic asthma to focus on the key components of long-term asthma management.

INTRODUCTION

Asthma affects many people across the United States and consumes millions of dollars in healthcare expenditures each year. The Division of Medical Assistance (DMA) has noted a steady increase in asthma prevalence in the North Carolina Medicaid population and has taken steps to improve care for persons with asthma. This study is an evaluation of a primary care provider-based intervention supported by the Division, which included the *NC DMA Asthma Collaborative for ACCESS 1 Practice* and other pediatric and family practices in the Carolina ACCESS system of care.

Over the past decade, DMA has developed several different managed care delivery systems in addition to fee-for-service care. In the traditional fee-for-service system, the provider is paid for specific services rendered to Medicaid recipients. In a managed care program, participating health care providers agree to treat and manage the care of Medicaid recipients. Currently, there are 3 types of managed care organizations in the North Carolina Medicaid system: Carolina ACCESS, ACCESS 2 (both primary care case management programs), and SouthCare (a health maintenance organization).

Carolina ACCESS: Introduced in 1991 and currently functioning statewide, Carolina ACCESS links a Medicaid recipient with a primary care physician (PCP) who agrees to coordinate the health care needs of their Medicaid population. The PCP acts as a gatekeeper to assure that appropriate preventive care and referral services are rendered. The PCP receives a management fee for their services. Carolina ACCESS is frequently called Carolina ACCESS 1 (CA1) in order to facilitate the distinction between Carolina ACCESS and ACCESS 2.

ACCESS 2: An extension of the Carolina ACCESS program, the ACCESS 2 & 3 managed care programs were established in 1998. Recently, the ACCESS 2 & 3 managed care programs were combined into ACCESS 2 (CA2). Administered by the North Carolina Office of Research, Demonstrations, and Rural Health Development, the ACCESS 2 program links Medicaid providers with health care networks which focus on community-based initiatives aimed at improving the quality and reducing the costs of Medicaid managed care. The ACCESS 2 networks initiate client case management services, seek to improve data accessibility through web-based technologies, work to decrease unnecessary medical utilization, and strive to improve patient education processes and outcomes.

Southcare: In 1996, Mecklenburg County and the North Carolina Division of Medical Assistance, working as equal partners, developed a Managed Care Project, Health Care Connection. Under Health Care Connection, Medicaid recipients enroll with a healthcare maintenance organization and are provided access to medical services with reimbursement on a capitated fee basis. As of December 2002, SouthCare/Coventry is the only HMO still operating in Mecklenburg County.

The intervention project, or collaborative, included twenty Carolina ACCESS practices; four of them became ACCESS 2 practices during the study period and were excluded from the study at that time. Carolina ACCESS providers participating in the asthma collaborative were taking part in three asthma management learning sessions, reinforcement and support conference calls, and evaluation procedures. The combination of activities offered intended to facilitate the implementation of evidence-based asthma management strategies within the practices. This study by DMA and the State Center for Health Statistics serves to evaluate trends in asthma-related utilization and cost of services for children

with asthma linked with the Carolina ACCESS collaborative practices, compared to a control group of non-participating Carolina ACCESS providers.

A previous study by DMA and the State Center for Health Statistics[1] examined the prevalence and treatment of persistent pediatric asthma across four systems of North Carolina Medicaid health care delivery.

METHODS

Through the efforts of the NC Center for Children's Healthcare Improvement (NCCHI), the *NC DMA Asthma Collaborative for ACCESS 1 Practice* was implemented in the year 2000, analogous to the 1999 Asthma Learning Collaborative within the ACCESS 2 managed care program. Like the 1999 collaborative, the *NC DMA Asthma Collaborative for ACCESS 1 Practice* was based on principles of continuous quality improvement and methods of the Institute for Healthcare Improvement's "Breakthrough Series" (BTS). Within the year 2000 collaborative, the following goals were set by participating providers:[2]

- Inclusion of the patient's asthma severity level on their medical record for at least 90% of the pediatric asthma population in the practice.
- Increase of the percentage of patients with asthma treated with asthma control medication (maintenance anti-inflammatory medications) to 100%.
- Inclusion of a written asthma management plan in the medical record for at least 90% of patients with asthma in the practice.
- Increase of the percentage of asthma symptom-free days for a two week period for patients with asthma to at least 90%.
- Reduction of ER visits of patients with asthma for asthma-related problems to less than 1% of patients.
- Reduction of hospital admissions for asthma to less than 2% of all patients with asthma.

Twenty Carolina ACCESS providers were part of the year 2000 asthma collaborative and included:

- ABC Pediatrics of Dunn
- Aegis Family Health Center
- Children's Clinic
- Cornerstone Medical Center
- Faith Pediatrics
- Henderson Pediatric Center
- Jill Roberson, MD
- John Knelson, MD
- Knox Clinic
- Larry C. Harris, MD
- Larry T. Jones, MD
- Masoud Ahdieh, MD
- Melrose Pediatrics
- Oxford Family Physicians
- Pamela Boland, MD

- Paulette Ingram, MD
- Rocky Mount/Nash Pediatrics
- Rutherford Pediatrics
- Sheila Bhagwandass, MD
- Wake County Health Department

Four of these practices, the Aegis Family Health Center, the Wake County Health Department, Larry T. Jones, and the Children's Clinic joined the ACCESS 2 program during the study period. They were excluded from the analyses after joining ACCESS 2.

For this evaluation study, only Carolina ACCESS general practice, family practice, and pediatric providers were included in the comparison group.

In order to select children with chronic asthma to include in the study, the Health Plan Employer Data and Information Set (HEDIS) developed by the National Committee for Quality Assurance (NCQA), was used. NCQA is a non-profit organization dedicated to assessing, measuring, and reporting health care delivered by health care systems, and to the improvement of the overall quality of health care. The HEDIS specifications NCQA produces are routinely used by managed care organizations and can be described as a set of performance standards aimed at measuring a wide variety of health care quality domains; for instance, the use of services, cost of care, effectiveness of care, and access to and availability of care across managed care systems. For the current study, the HEDIS specifications for each year of the evaluation study were employed to identify persons with chronic asthma.[3] HEDIS considers a person to have chronic asthma if he or she has had:

- one or more inpatient visits with a principal diagnosis of asthma, and/or
- one or more ED visits with a principal diagnosis of asthma, and/or
- four asthma medication dispensing events, and /or
- four or more outpatient visits with any diagnosis of asthma and two or more asthma medication dispensing events

in a specific (fiscal) year.[3]

Five to seventeen year-old children with chronic asthma according to the HEDIS specifications described above were included in the study if they had no enrollment gap longer than a month per fiscal year with Carolina ACCESS as their system of care.

For this project, we used the HEDIS NDC list (The National Drug Code List) titled *Use of Appropriate Medications for People with Asthma - Numerator* to select appropriate medications for children with asthma, and the HEDIS NDC list titled *Use of Appropriate Medications for People with Asthma - Denominator* to select possible medications prescribed to children with asthma. Per HEDIS specifications, asthma long-term control medications can be grouped into the following categories:[3]

- Inhaled corticosteroids
- Cromolyn sodium and nedocromil
- Leukotriene modifiers
- Methylxanthines
- Long-acting, inhaled beta-2 agonists.

The first four groups are considered appropriate asthma control medications, and all five (including the last category of long-acting, inhaled beta-2 agonists regarded as add-on for long-term asthma therapy) are included in the possible asthma control medications list. NCQA regularly publishes these NDC lists on its website (http://www.ncqa.org/index.htm).

The Claims and Claim Detail tables of the DRIVE system were used to extract information on the number of children with chronic asthma and their use of services, such as inpatient stays, outpatient and ER visits, and prescription drugs, as well as information on the collaborative providers. The Claim Detail variable "Procedure Revenue Code" contains codes to identify inpatient, outpatient, and ER visit services according to the HEDIS specifications. The variable "National Drug Code" comprises the codes used to locate asthma long-term control medications in accordance with the HEDIS specifications. Collaborative providers were selected by their Carolina ACCESS PCP Number. The Provider Population Group and Provider Population Group Date tables were queried to obtain the provider specialty information needed to identify the comparison group providers. The Provider Population Group table variable PCP_SPECIALTY_CODE contained the provider specialty information (code 001 for general/family practice and code 037 for pediatrics).

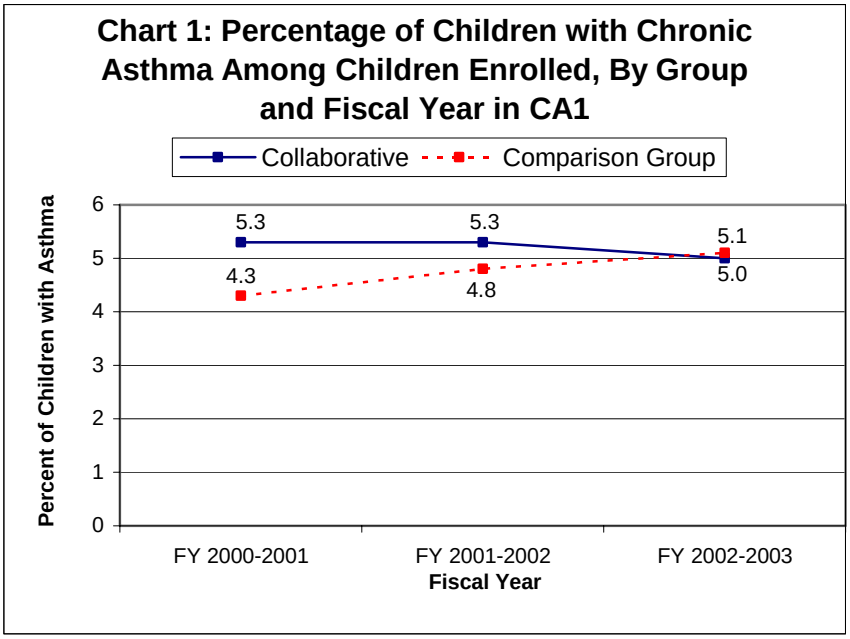
RESULTS

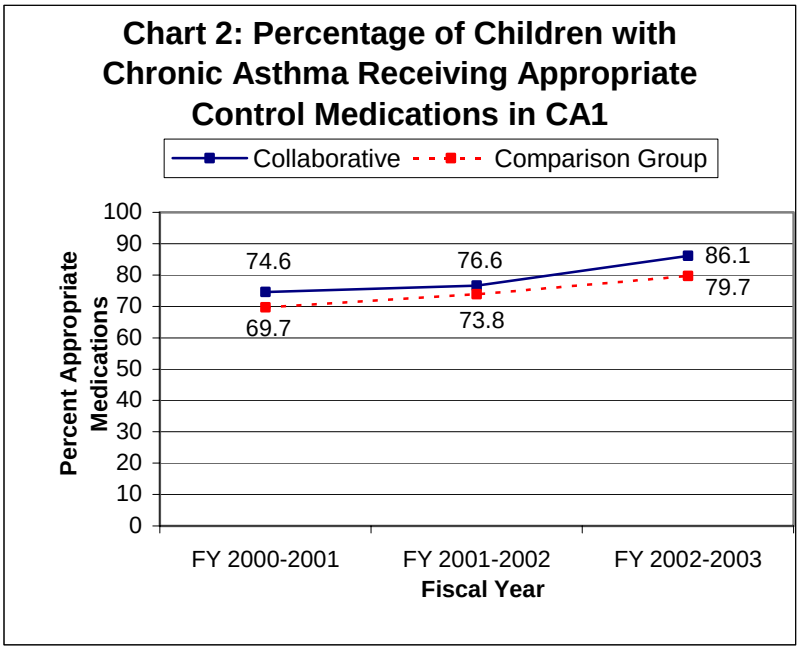
Table 1: Number of Children Enrolled in Carolina ACCESS, Number with Chronic Asthma, and Percentage of Children with Chronic Asthma for FY 2000-2001, FY 2001-2002, and FY 2002-2003, by Study Group.

	Children Ages 5-17		
	Number Continuously Enrolled	Number with Chronic Asthma	Percentage with Chronic Asthma
FY 2000-2001			
Collaborative	18,248	963	5.3
Comparison Group	56,838	2,464	4.3
FY 2001-2002			
Collaborative	19,752	1,055	5.3
Comparison Group	58,907	2,856	4.8
FY 2002-2003			
Collaborative	17,743	889	5.0
Comparison Group	61,745	3,134	5.1

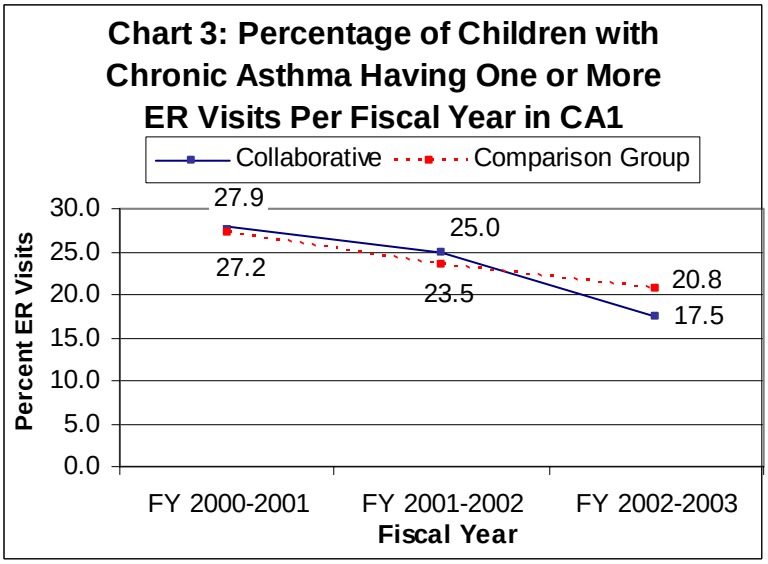
In FY 2000-2001, 18,248 children ages 5 to 17 were continuously enrolled and linked to a provider within the asthma collaborative. In FY 2001-2002, the number increased to 19,752, and subsequently decreased in FY 2002-2003 to 17,743 continuously enrolled children linked to a provider within the

asthma collaborative (See Table 1). In FY 2000-2001, 5.3% of the enrolled children linked to collaborative Carolina ACCESS providers had chronic asthma. The percentage of children with chronic asthma stayed the same for FY 2001-2002, and declined slightly for FY 2002-2003 (5.0% for Carolina ACCESS practices within the collaborative). In contrast, 56,838 children ages 5 to 17 were continuously enrolled with a Carolina ACCESS pediatric or family practice provider in the comparison group in FY 2000-2001. About 4.3% of the children linked to a Carolina ACCESS provider in the comparison group had chronic asthma. In FY 2001-2002, the enrollment numbers increased to 58,907 enrolled children linked to Carolina ACCESS providers in the comparison group. The percentage of children with chronic asthma increased to 4.8%. In FY 2002-2003, 61,745 children ages 5 to 17 were enrolled with a Carolina ACCESS provider linked to the comparison group. The group of children with chronic asthma increased to 5.1%. Chart 1 below displays the percentage of children with chronic asthma among children continuously enrolled with Carolina ACCESS providers in the collaborative and the comparison group.



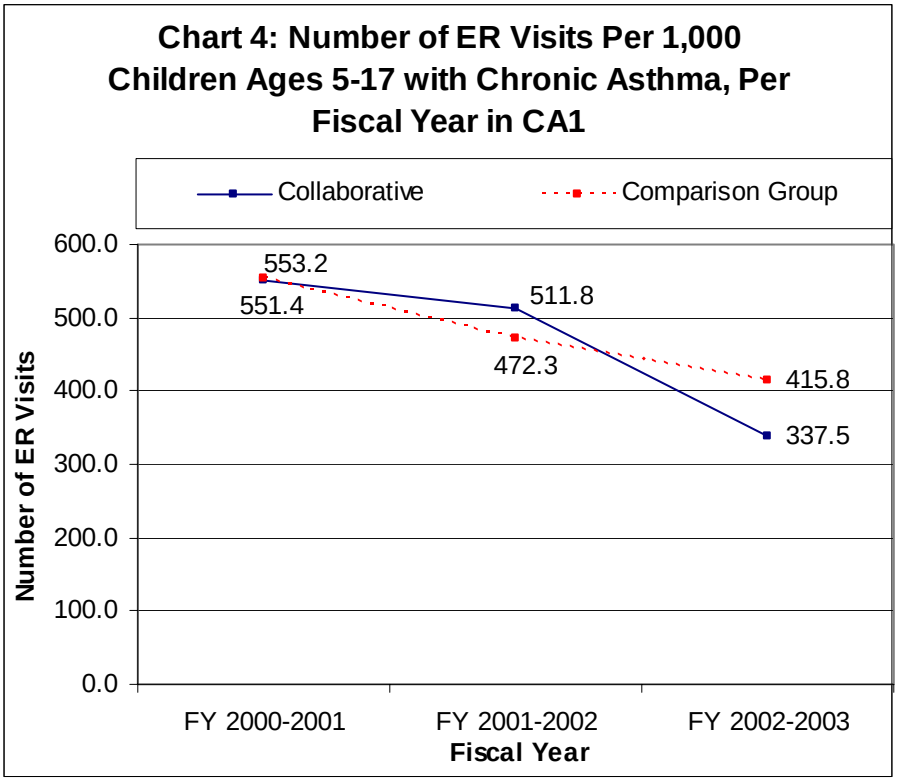


The percentage of children ages 5 to 17 with chronic asthma receiving appropriate asthma control medications from their Carolina ACCESS collaborative providers increased from 74.6% in FY 2000-2001 to 76.6% in FY 2001-2002, and 86.1% in FY 2002-2003 (Chart 2). In comparison, children with chronic asthma in the comparison group received appropriate asthma control medications at a lower rate: 69.7% received appropriate asthma control medications in FY 2000-2001, 73.8% in FY 2001-2002, and 79.7% in FY 2002-2003.

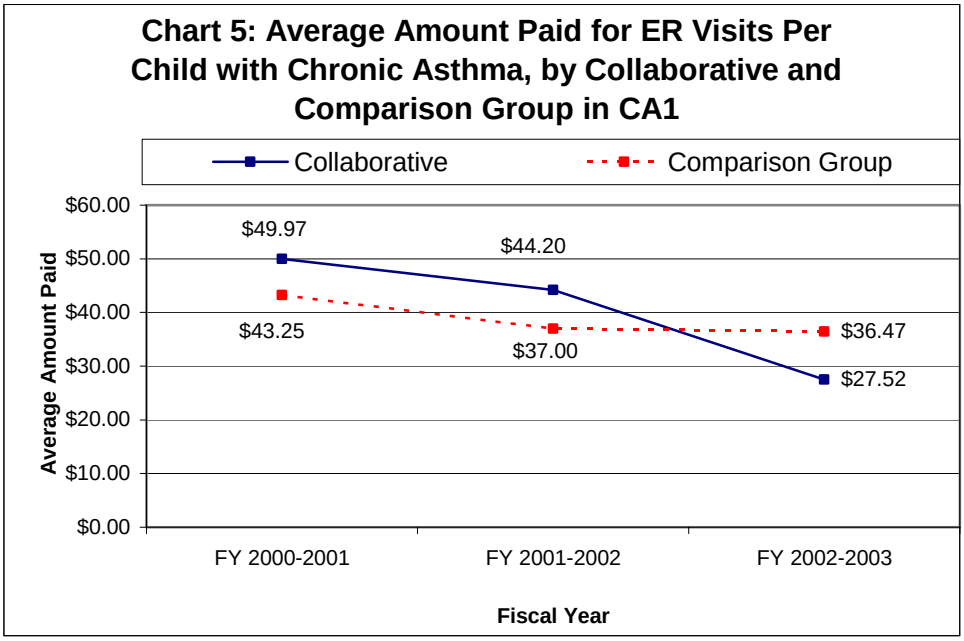


The percentage of children with chronic asthma having one or more asthma-related ER visits per fiscal year decreased for both groups between FY 2000-2001 and FY 2002-2003 (Chart 3). The decrease was slightly more pronounced for the collaborative group with 27.9% having one or more asthma-related ER visits in FY 2000-2001, 25.0% with asthma-related ER visits in FY 2001-2002, and 17.5% with

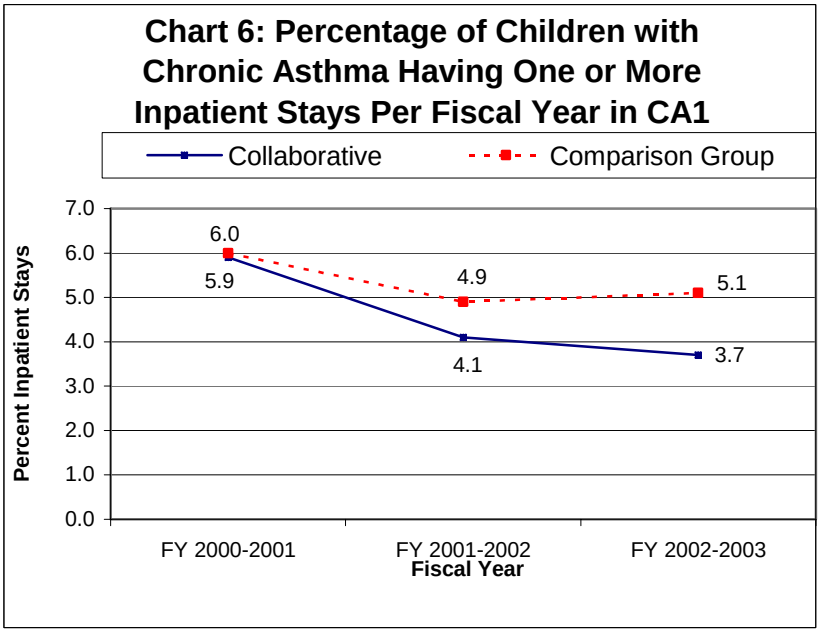
asthma-related ER visits in FY 2002-2003. The percentage of children with chronic asthma in the comparison group having one or more asthma-related ER visits decreased from 27.2% in FY 2000-2001 to 23.5% in FY 2001-2002, and 20.8% in FY 2002-2003. Asthma-related ER visits were identified by primary diagnosis and specific procedure revenue codes on the hospital claim for Medicaid reimbursement (See reference 3 and appendix).



The asthma-related ER visit rates (Chart 4) declined in the time period from FY 2000-2001 to FY 2002-2003 for both groups studied, similarly to the percentages shown above (from 551.4 to 511.8 and 337.5 for the collaborative; and from 553.2 to 472.3 and 415.8 for the comparison group).

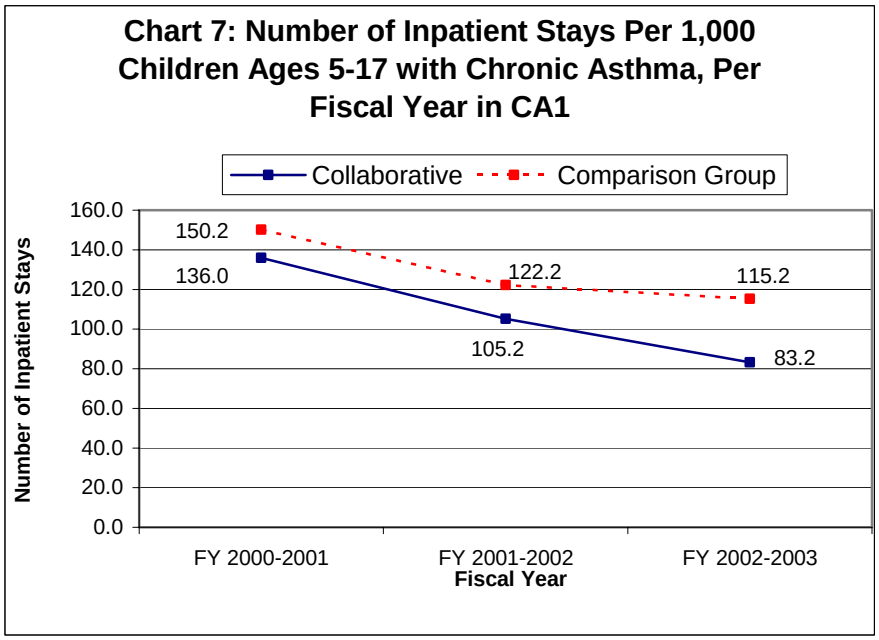


The average amount paid for asthma-related ER visits per child with chronic asthma in the collaborative decreased from $49.97 in FY 2000-2001 to $44.20 in FY 2001-2002, to $27.52 in FY 2002-2003: a rather pronounced decrease (Chart 5). In comparison, the average amount paid for asthma-related ER visits per child with chronic asthma in the comparison group decreased from $43.25 in FY 2000-2001 to $37.00 in FY 2001-2002, and to $36.47 in FY 2002-2003.

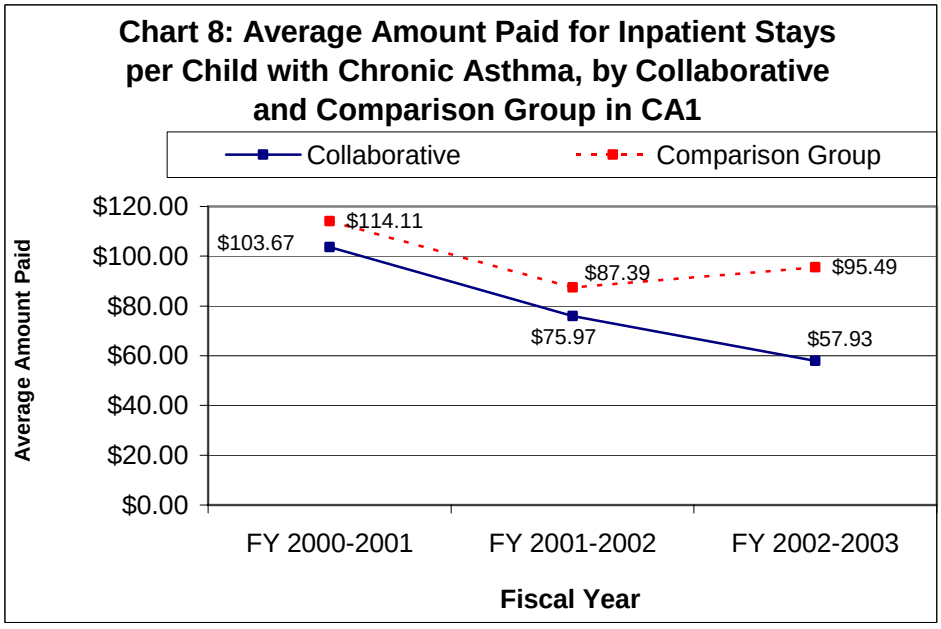


The percentage of children with chronic asthma having one or more asthma-related inpatient stays was similar for the collaborative and comparison group in FY 2000-2001 (5.9% and 6.0%), and was lower for both in the following two fiscal years (Chart 6). Again, the decrease was steeper for the collaborative group: 4.1% in FY 2001-2002, and 3.7% in FY 2002-2003. For the comparison group,

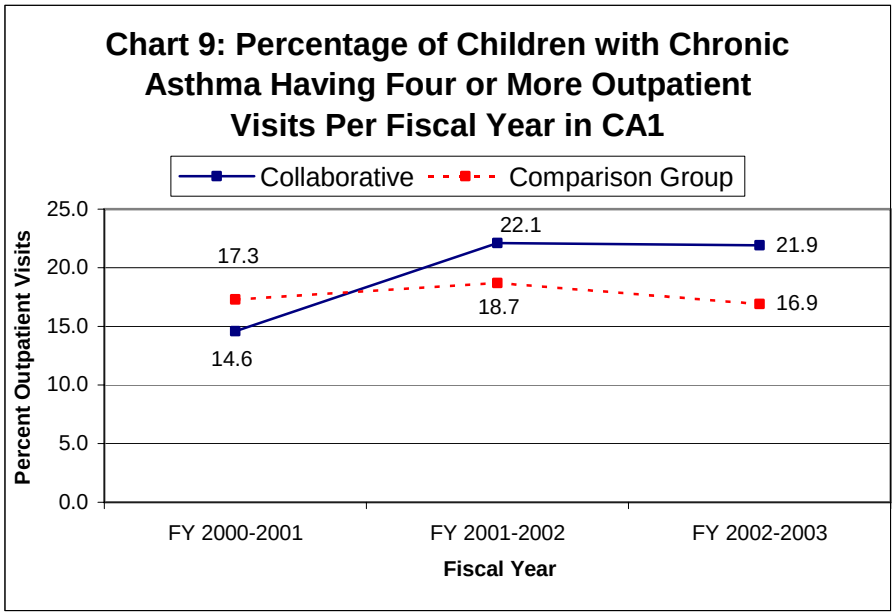
the percentage declined to 4.9% in FY 2001-2002, with a slight increase to 5.1% in FY 2002-2003. Asthma-related inpatient stays were identified by primary diagnosis and specific procedure revenue codes on the claim for Medicaid reimbursement (See reference 3 and appendix).



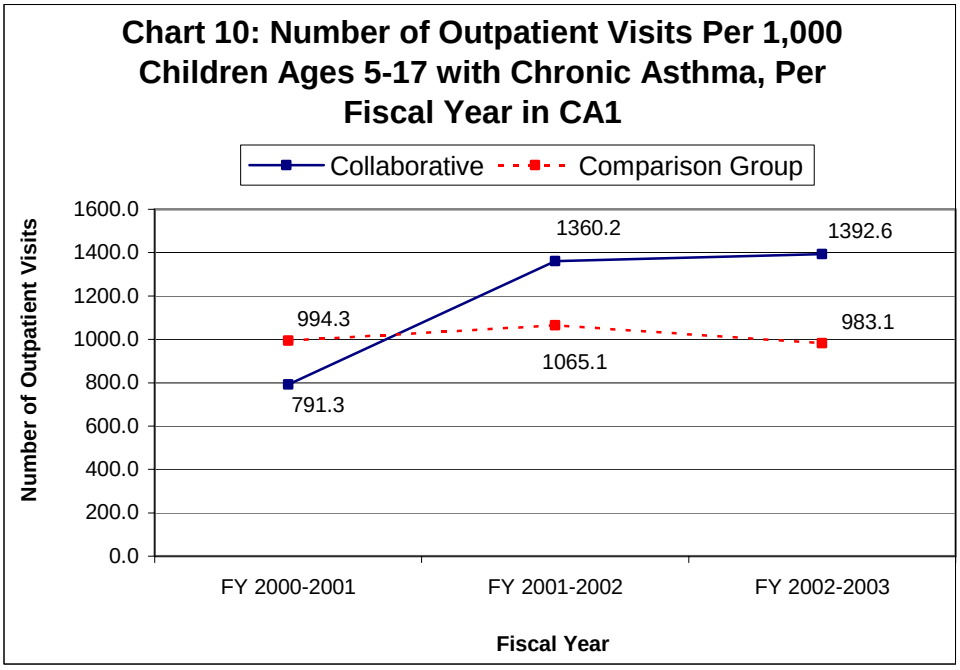
The number of asthma-related hospital inpatient stays per 1,000 children with chronic asthma decreased for both groups between FY 2000-2001 and FY 2002-2003 (Chart 7). The decrease was more marked for the collaborative group with 136.0 inpatient stays per 1,000 children in FY 2000-2001, 105.2 in FY 2001-2002, and 83.2 in FY 2002-2003. Children in the comparison group had 150.2 inpatient stays per 1,000 children in FY 2000-2001, 122.2 in FY 2001-2002, and 115.2 in FY 2002-2003.



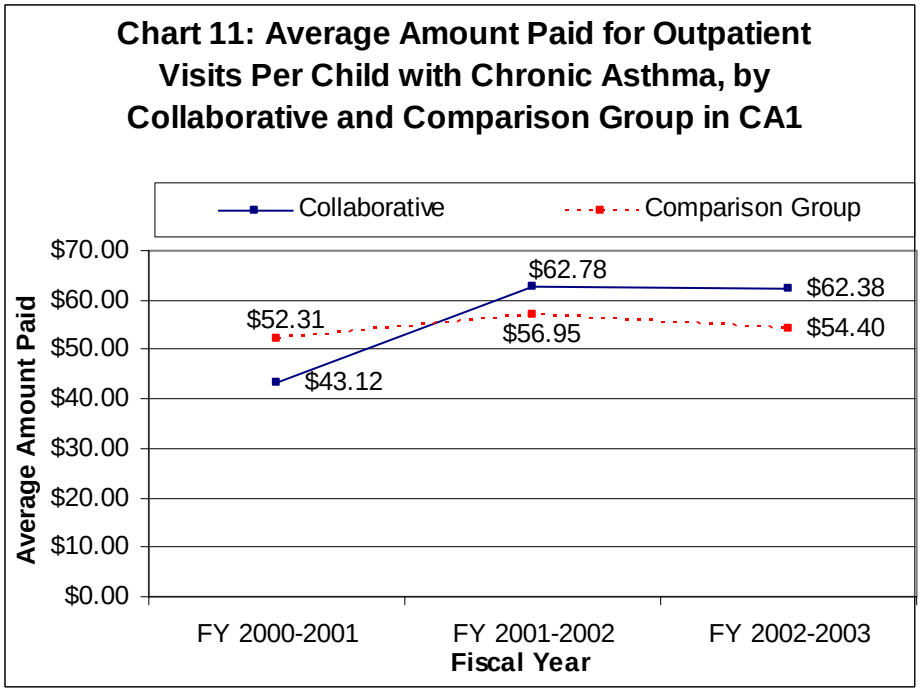
The average amount paid for asthma-related inpatient stays per child with chronic asthma in the collaborative decreased considerably from $103.67 in FY 2000-2001 to $75.97 in FY 2001-2002, and to $57.93 in FY 2002-2003 (Chart 8). In comparison, the average amount paid for inpatient stays per child with chronic asthma in the comparison group decreased from $114.11 in FY 2000-2001 to $87.39 in FY 2001-2002, and increased slightly to $95.49 in FY 2002-2003.



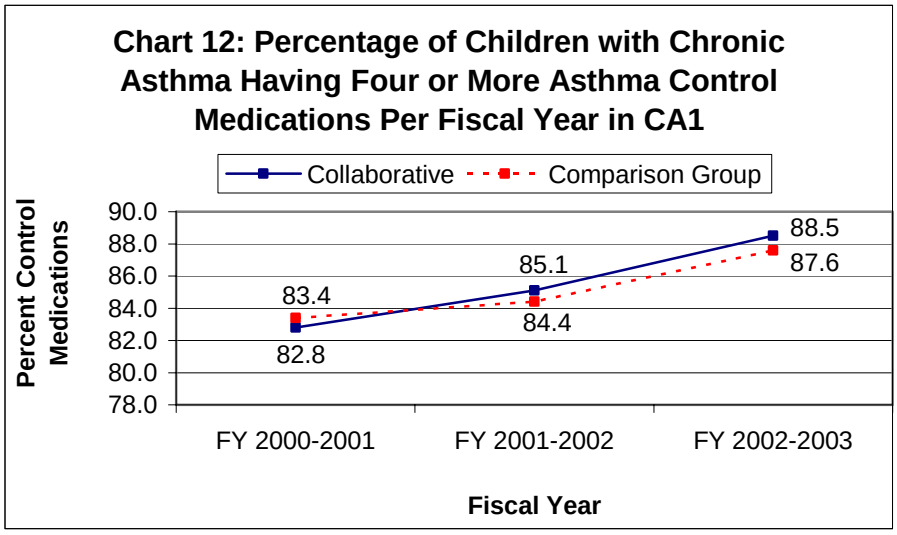
The percentage of children with chronic asthma having four or more asthma-related outpatient visits (and two or more asthma control drugs, as defined by HEDIS) stayed about the same for the comparison group over all three fiscal years (17.3% in FY 2000-2001, 18.7% in FY 2001-2002, and 16.9% in FY 2002-2003) (See Chart 9). For the collaborative, there was a pronounced increase between FY 2000-2001 and FY 2001-2002 (from 14.6% to 22.1%), and for FY 2002-2003, the percentage stayed about the same as for the previous fiscal year (21.9%). Asthma-related outpatient visits were identified by any diagnosis of asthma and specific procedure revenue codes on the outpatient physician claim for Medicaid reimbursement. Outpatient visits were counted here only if the child also had two or more asthma medications during the year (according to HEDIS criteria). (See reference 3 and appendix.)



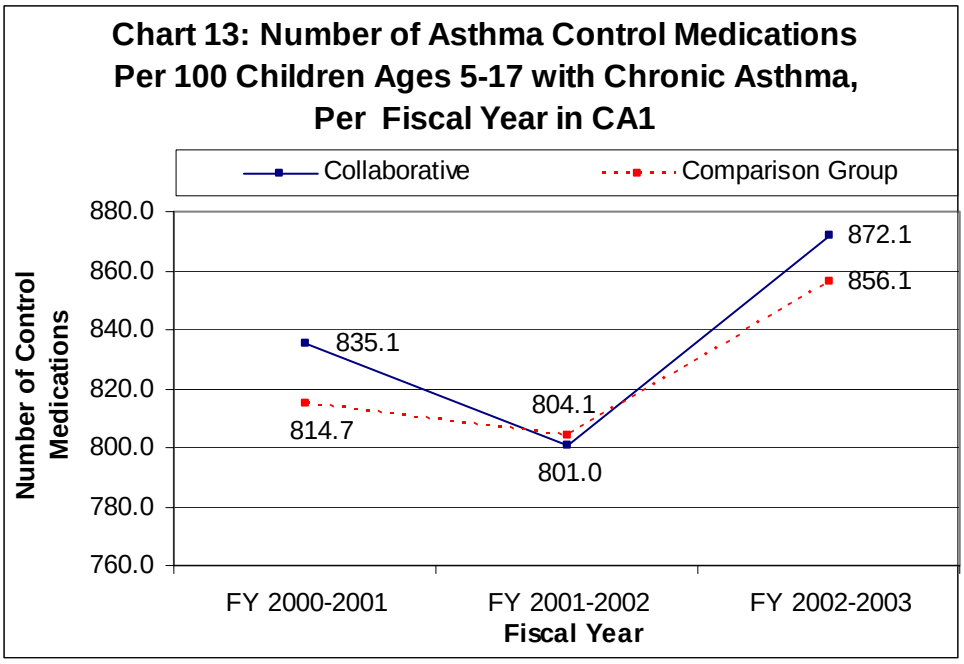
The number of asthma-related outpatient visits per 1,000 children with chronic asthma in the collaborative and the comparison group echoed the pattern observed in Chart 9 (see Chart 10). The number of outpatient visits per 1,000 children with chronic asthma in the comparison group varied slightly around 1,000 in the three fiscal years. For the collaborative, a salient increase could be observed from 791 visits in FY 2000-2001 to 1360 in FY 2001-2002, and, subsequently, a stabilization on that level for FY 2002-2003 (1,393 visits per 1,000 children with asthma).



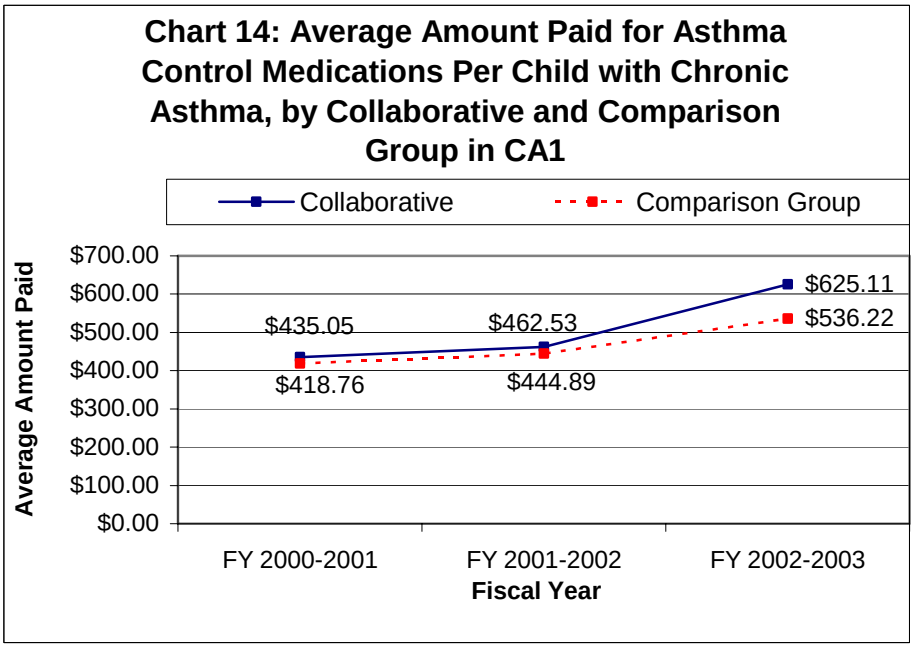
The average amount paid for asthma-related outpatient visits per child in the collaborative increased from FY 2000-2001 ($43.12) to FY 2001-2002 ($62.78), and stayed about the same for FY 2002-2003 ($62.38) (See Chart 11). For the comparison group, there was not much variation in the three fiscal years: the average amount was $52.31 in FY 200-2001, $56.95 in FY 2001-2002, and $54.40 in FY 2002-2003.



The percentage of children with chronic asthma having four or more asthma control medications per fiscal year increased for both the collaborative and the comparison group (Chart 12). For the comparison group, the percentage of Carolina ACCESS children having four or more asthma control medications as defined by the HEDIS NDC list increased from 83.4% in FY 2000-2001 to 84.4% in FY 2001-2002, and 87.6% in FY 2002-2003. In comparison, the percentage of children with chronic asthma in the collaborative having four or more asthma control medications per fiscal year increased from 82.8% in FY 2000-2001 to 85.1% in FY 2001-2002, and to 88.5% in FY 2002-2003.



The number of long-term asthma control medications per 100 children decreased for the collaborative and comparison group from FY 2000-2001 to FY 2001-2002 (Chart 13). The following fiscal year was characterized by a pointed increase for both groups, to 872.1 for the collaborative and 856.1 for the comparison group.



The average amount paid for asthma control medications per child with chronic asthma in the collaborative group increased from $435.05 in FY 2000-2001 to $462.53 in FY 2001-2002, and, markedly, to $625.11 in FY 2002-2003 (Chart 14). In comparison, the average amount paid for asthma

control medications per child with chronic asthma in the comparison group increased from $418.76 in FY 2000-2001 to $444.89 in FY 2001-2002, and to $536.22 in FY 2002-2003.

ACCESS 2 DATA FOR FY 2002-2003

A total of four providers in the Carolina ACCESS collaborative switched to ACCESS 2 during the study period. The Aegis Family Health Center switched to ACCESS 2 in December of 2001, the Wake County Health Department in November of 2002, Larry T. Jones in March of 2003, and the Children's Clinic in April of 2003. Consequently, there are very limited data available on the management and treatment of children with chronic asthma by ACCESS 2 providers in the collaborative. As more collaborative providers switch to ACCESS 2 after this study period, enough data will be available for comparison among the different systems of Medicaid Managed Care, and more comprehensive and reliable analysis.

It is important to review the selected data on ACCESS 2 providers presented below with caution due to the small number of children with chronic asthma linked to ACCESS 2 providers in the collaborative (only 171 children in FY 2002-2003). Data on service use might be influenced by random variation due to small numbers in the numerators. In the data presented below, the FY 2002-2003 percentages for the ACCESS 2 comparison group are based on 4,527 children with chronic asthma, from non-collaborative ACCESS 2 general practice, family practice, and pediatric providers.

The data for ACCESS 2 for FY 2002-2003 differ considerably from the Carolina ACCESS data presented above. In FY 2002-2003, children with chronic asthma managed by ACCESS 2 providers within the collaborative did not fare as well as their counterparts managed by Carolina ACCESS providers within the collaborative with regard to all indicators analyzed. The most salient differences were found in the areas of treatment with appropriate medications and use of ER services. The results for children with chronic asthma managed by ACCESS 2 collaborative providers were not as favorable as for children with chronic asthma managed by ACCESS 2 providers in the comparison group in most measures studied. The percentage of children ages 5 to 17 with chronic asthma receiving appropriate asthma control medications from their ACCESS 2 collaborative providers was 76.6% in FY 2002-2003. In the comparison group, 85.9% of children with chronic asthma were receiving appropriate asthma control medications from their ACCESS 2 providers. More than one third (34.5%) of the children with chronic asthma linked to collaborative ACCESS 2 providers went to the ER one or more times in FY 2002-2003 compared to about one in five (19%) children linked to ACCESS 2 providers in the comparison group. The percentage of ACCESS 2 children with chronic asthma having one or more inpatient stays in FY 2002-2003 was relatively similar for the two groups with 4.1% of the children in the collaborative, and 4.6% in the comparison group having one or more inpatient stays in this time period. The percentage of ACCESS 2 children with chronic asthma having four or more outpatient visits (and two or more asthma control medications) in FY 2002-2003 was 19.3% for the collaborative, and, slightly higher, 20.4% for the comparison group. Slightly more than 81% of children with chronic asthma linked to ACCESS 2 providers in the collaborative had four or more asthma control medications in FY 2002-2003, compared to slightly more than 88% of children with chronic asthma linked to ACCESS 2 providers in the comparison group.

SUMMARY AND DISCUSSION

The results of this study show that between 5% and 6% of children ages 5 - 17, who were continuously enrolled with their system of care, had chronic asthma as defined by HEDIS criteria. The percentage of children with chronic asthma linked to Carolina ACCESS comparison group providers increased over the three year period studied whereas the percentages for Carolina ACCESS collaborative providers decreased slightly in the same time period.

The percentage of children with chronic asthma receiving appropriate medications increased over the three fiscal years: for children linked to Carolina ACCESS providers in the comparison group, it increased from 69.7% to 79.7% in the three years studied, and for children linked to collaborative Carolina ACCESS providers, it increased from 74.6% to 86.1%. The average amount paid for asthma control medications per child with chronic asthma in the collaborative increased from $435 in FY 2000-2001 to $625 in FY 2002-2003. For the comparison group, the average amount paid for asthma control medication per child with chronic asthma increased from $419 in FY 2000-2001 to $536 in FY 2002-2003. The noticeable increase in the collaborative's treatment with medications could be seen in context of the project's objective of achieving 100% asthma control medication treatment for asthma patients.

The percentage of children with chronic asthma having ER visits decreased in the three fiscal years studied: for children linked to Carolina ACCESS providers in the comparison group, the percentage of children with ER visits decreased from 27.2% to 20.8%, and for children linked to Carolina ACCESS providers in the collaborative, it decreased from 27.9% to 17.5%. Although a considerable reduction in the percentage of children with ER visits for the collaborative group can be noted, it is still significantly higher than the percentage targeted in the project goals of less than 1% of asthma patients. The average amount paid for ER visits per child with chronic asthma in the collaborative decreased markedly from $50 in FY 2000-2001 to $28 in FY 2002-2003. For the comparison group, the average amount paid for ER visits per child with chronic asthma decreased from $43 in FY 2000-2001 to $36 in FY 2002-2003. The average amount paid for ER visits per child with chronic asthma decreased by 45% for the collaborative.

The average amount paid for inpatient hospitalizations in the collaborative declined markedly from $104 in FY 2000-2001 to $58 in FY 2002-2003. For the comparison group, the average amount paid for inpatient hospitalizations per child with chronic asthma decreased from $114 in FY 2000-2001 to $95 in FY 2002-2003. The percentage of inpatient hospitalizations declined in the time period between FY 2000-2001 to FY 2002-2003: for children linked to Carolina ACCESS providers in the comparison group, the percentage of children hospitalized with chronic asthma declined from 6.0% to 5.1%, and for children linked to Carolina ACCESS providers in the collaborative, the percentage declined from 5.9% to 3.7%. The objective for the collaborative project was a reduction of the percentage with hospital admissions for persons with asthma to less than 2%.

The average amount paid for outpatient visits in the collaborative increased from $43 in FY 2000-2001 to $62 in FY 2002-2003. For the comparison group, the average amount paid for outpatient visits per child with chronic asthma increased slightly from $52 in FY 2000-2001 to $54 in FY 2002-2003. The percentage with outpatient visits did not change much for the comparison group, and increased for the collaborative Carolina ACCESS providers. For the comparison group, the percentage of children with chronic asthma having four or more outpatient visits changed slightly from 17.3% in FY 2000-2001 to

16.9% in FY 2002-2003. For children linked to Carolina ACCESS providers in the collaborative, the percentage increased from 14.6% in FY 2000-2001 to 21.9% in FY 2002-2003. A higher percentage of children with four or more outpatient visits might indicate a greater effort to manage the children's asthma in order to avoid more serious episodes that could lead to ER visits or inpatient stays.

The following information combines the amounts spent for asthma control medications, ER visits, inpatient hospitalizations, and outpatient visits. For Carolina ACCESS collaborative providers, the average total amount paid per child with chronic asthma was $632 in FY 2000-2001, $570 in FY 2001-2002, and $773 in FY 2002-2003. For the comparison group, the average total amount paid per child with chronic asthma was $628 in FY 2000-2001, $626 in FY 2001-2002, and $723 in FY 2002-2003. Over all three fiscal years, the average total amount paid per child with chronic asthma per year was $652 for the collaborative, and, slightly higher, $663 for the comparison group. Though the average amount spent per child with chronic asthma is very similar for the collaborative and the comparison group Carolina ACCESS providers, the services the children utilized differed substantially. The number of inpatient and ER services utilized by children with chronic asthma in the collaborative decreased over time as did the average amount paid for these services per child with chronic asthma. The number of outpatient services and asthma long-term control medications and also the average amount paid for these services per child with chronic asthma increased over the time period for the collaborative. For the comparison group, the results show trends in the same direction, but are not as pronounced as for the collaborative. The result is that in FY 2002-2003, the Carolina ACCESS collaborative providers had substantially higher levels of outpatient and long-term asthma control medicine use than the comparison group, and lower levels of hospital and emergency room use. Regular and frequent outpatient visits provide the opportunity for providers and their patients with chronic asthma to focus on the key components of long-term asthma management.[4]

Limitations of the data used for the study need to be noted: the Medicaid data used to extract the information on children with chronic asthma are based on billing information, which may not provide a complete picture of the diagnosis and treatment of children with chronic asthma. It is unclear, for instance, if the prescribed medication has been taken appropriately, and will, therefore, have the intended long-term control effect on the asthma disease.

Overall, the results here show a positive picture of pediatric asthma management among Carolina ACCESS collaborative providers. Hospital and emergency room use by the children with chronic asthma have decreased over time, and outpatient visits and use of appropriate asthma control medications have increased. Carolina ACCESS collaborative providers generally have better levels on these measures than the Carolina ACCESS comparison group. Efforts should be continued to promote this asthma management model among pediatric Medicaid providers.

REFERENCES

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2) The North Carolina Division of Medical Assistance: *Building and Strengthening Capacity to Promote and Maintain High Quality Care for Medicaid Beneficiaries: The North Carolina Division of Medical Assistance Asthma Learning Collaborative*. End of Project Report July 1, 2000 - June 30, 2002.

3) National Committee for Quality Assurance (NCQA): *HEDIS 2000*, Volume 2, Technical Specifications. Washington, DC: National Committee for Quality Assurance, 1999.
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Note: For FY 2000-2001, the HEDIS technical specifications for 2000, for FY 2001-2002, the HEDIS specifications for 2001, and for FY 2002-2003, the HEDIS specifications for 2002 were used.

4) U.S. Department of Health and Human Services Public Health Service, National Institutes of Health National Heart, Lung, and Blood Institute: *Practical Guide for the Diagnosis and Management of Asthma*. Based on the Expert Panel Report 2: Guidelines for the Diagnosis and Management of Asthma. NIH Publication No. 97-4053, October 1997.

APPENDIX

HEDIS Codes to Identify Acute Inpatient and Outpatient Services, and ER Visits, 2000-2002.

	Inpatient services	Outpatient services	ER visits
	for 2000	**for 2000**	**for 2000**
Procedure revenue codes used to define persons with chronic asthma (in addition to primary diagnosis/any diagnosis, and for outpatient services, medication)	To select inpatient services, claim details of children with a primary diagnosis of asthma and one the following procedure revenue codes were included: 99217, 99218, 99219, 99220, 99221, 99222, 99223, 99231, 99232, 99233, 99238, 99239, 99251, 99252, 99253, 99254, 99255, 99261, 99262, 99263, RC100, RC101, RC110, RC111, RC112, RC113, RC114, RC115, RC116, RC117, RC118, RC119, RC120, RC121, RC122, RC123, RC124, RC125, RC126, RC127, RC129, RC130, RC131, RC132, RC133, RC134, RC135, RC136, RC137, RC139, RC140, RC141, RC142, RC143, RC144, RC145, RC146, RC147, RC148, RC149, RC150, RC151, RC152, RC153, RC154, RC155, RC156, RC157, RC158, RC159, RC160, RC164, RC167, RC169, RC200, RC201, RC202, RC203, RC204, RC206, RC207, RC208, RC209, RC210, RC211, RC212, RC213, RC214, RC219, RC220, RC221, RC222, RC223, RC224, RC229, RC720, RC721, RC722, RC723, RC724, RC729, RC987.	To select outpatient visits, claim details of children with any diagnosis of asthma and one the following procedure revenue codes were included: 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99271, 99272, 99273, 99274, 99275; the children also needed to have two or more long-term control medications listed on the HEDIS NDC list.	To select ER visits, claim details of children with a primary diagnosis of asthma and one the following procedure revenue codes were included: 99281, 99282, 99283, 99284, 99285, 99288, RC450, RC451, RC452, RC456, RC459, RC981.

	Inpatient services	Outpatient services	ER visits
	for 2001 and 2002	**for 2001 and 2002**	**for 2001 and 2002**
Procedure revenue codes used to define persons with chronic asthma (in addition to primary diagnosis/any diagnosis, and for outpatient services, medication)	To select inpatient services, claim details of children with a primary diagnosis of asthma and one the following procedure revenue codes were included: 99217, 99218, 99219, 99220, 99221, 99222, 99223, 99231, 99232, 99233, 99238, 99239, 99251, 99252, 99253, 99254, 99255, 99261, 99262, 99263, 99291, 99292, RC100, RC101, RC110, RC111, RC112, RC113, RC114, RC115, RC116, RC117, RC118, RC119, RC120, RC121, RC122, RC123, RC124, RC125, RC126, RC127, RC129, RC130, RC131, RC132, RC133, RC134, RC135, RC136, RC137, RC139, RC140, RC141, RC142, RC143, RC144, RC145, RC146, RC147, RC148, RC149, RC150, RC151, RC152, RC153, RC154, RC155, RC156, RC157, RC158, RC159, RC160, RC164, RC167, RC169, RC200, RC201, RC202, RC203, RC204, RC206, RC207, RC208, RC209, RC210, RC211, RC212, RC213, RC214, RC219, RC220, RC221, RC222, RC223, RC224, RC229, RC987.	To select outpatient visits, claim details of children with any diagnosis of asthma and one the following procedure revenue codes were included: 99201, 99202, 99203, 99204, 99205, 99211, 99212, 99213, 99214, 99215, 99241, 99242, 99243, 99244, 99245, 99271, 99272, 99273, 99274, 99275, RC510, RC516, RC517, RC520, RC521, RC523, RC760-RC769; the children also needed to have two or more long-term control medications listed on the HEDIS NDC list.	To select ER visits, claim details of children with a primary diagnosis of asthma and one the following procedure revenue codes were included: 99281, 99282, 99283, 99284, 99285, 99288, RC450, RC451, RC452, RC456, RC459, RC981.
Differences	*Differences*	*Differences*	*Differences*
	Changes compared to 2000:	**Changes** compared to 2000:	**Changes** compared to 2000:
	Excluded: RC720, RC721, RC722, RC723, RC724, RC729. **Additionally included:** 99291, 99292.	**Additionally included:** RC510, RC516, RC517, RC520, RC521, RC523, RC760-RC769.	**None.**